International Energy Agency

Global Hydrogen Review 2022

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Global and European Hydrogen Market Developments - 2022 in review, virtual, 12 December 2022

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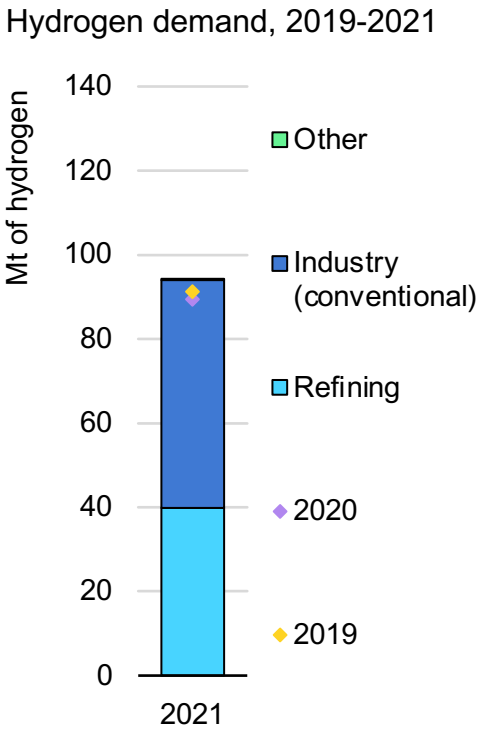
Momentum keeps growing, with new drivers emerging

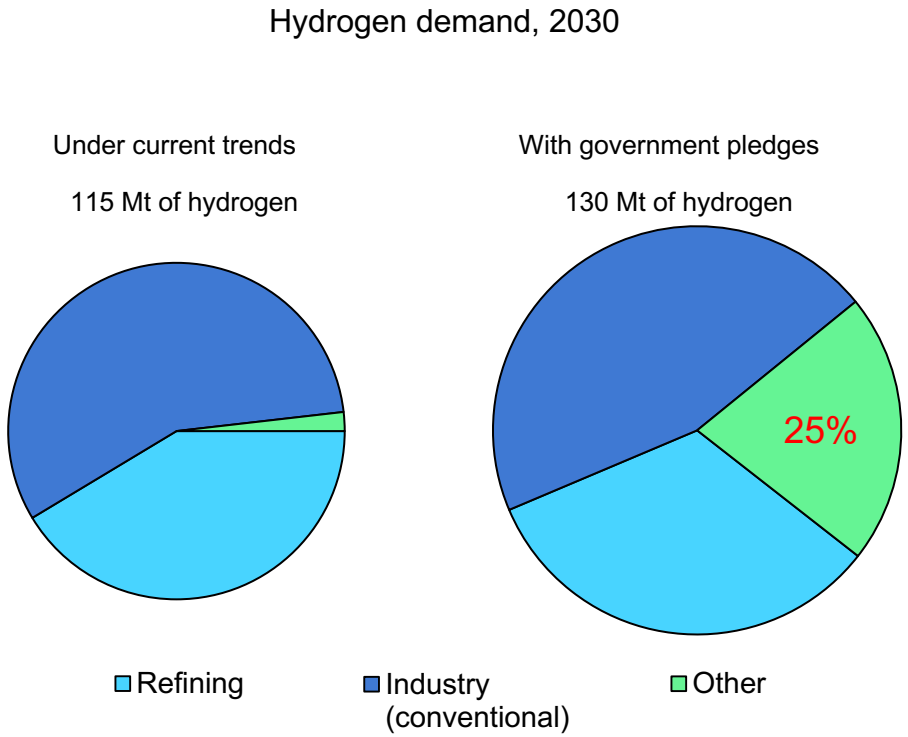
- Hydrogen is widely recognised as an important option in supporting climate ambitions; it can also help enhance energy security

- Net-zero pledges are boosting hydrogen interest, further bolstered by the global energy crisis:
  - Nine new national strategies were adopted last year
  - Large projects are starting to reach FID and major players are signing off-take agreements
  - Growing international cooperation to develop hydrogen trade

- Adoption of low-emission hydrogen as energy vector is at an early stage and needs regular and effective tracking

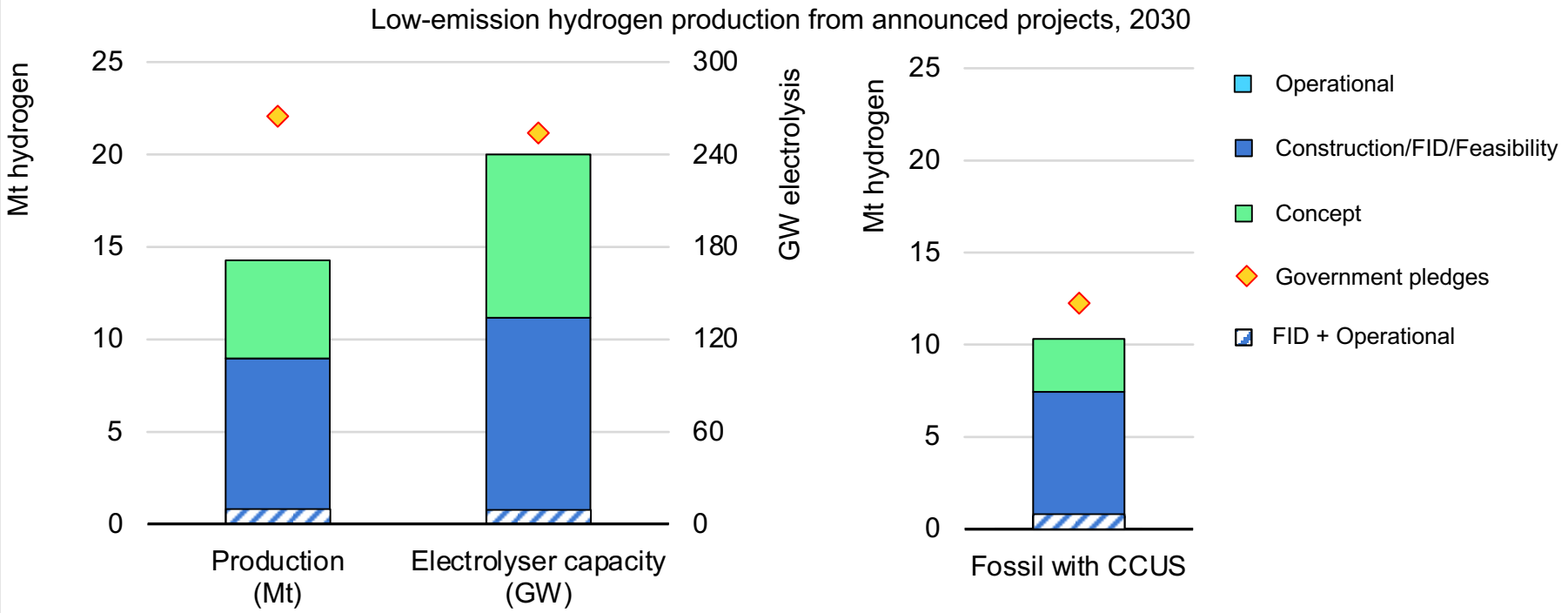
Demand is growing, with positive signals in key applications





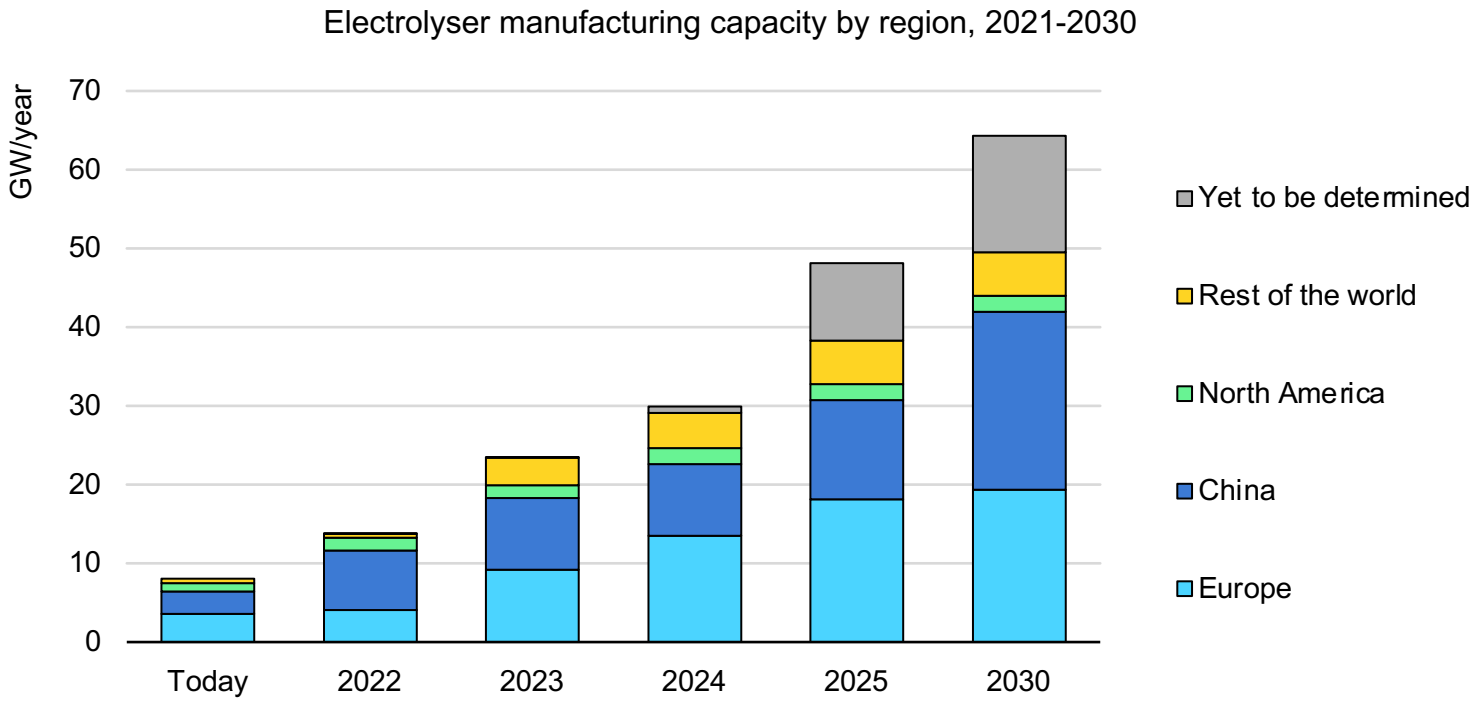
There are plans to increase hydrogen use in heavy industry, transport and power generation, but ambitious policies are needed for hydrogen to play its role in meet government climate pledges

An increasing project pipeline for low-emission hydrogen production



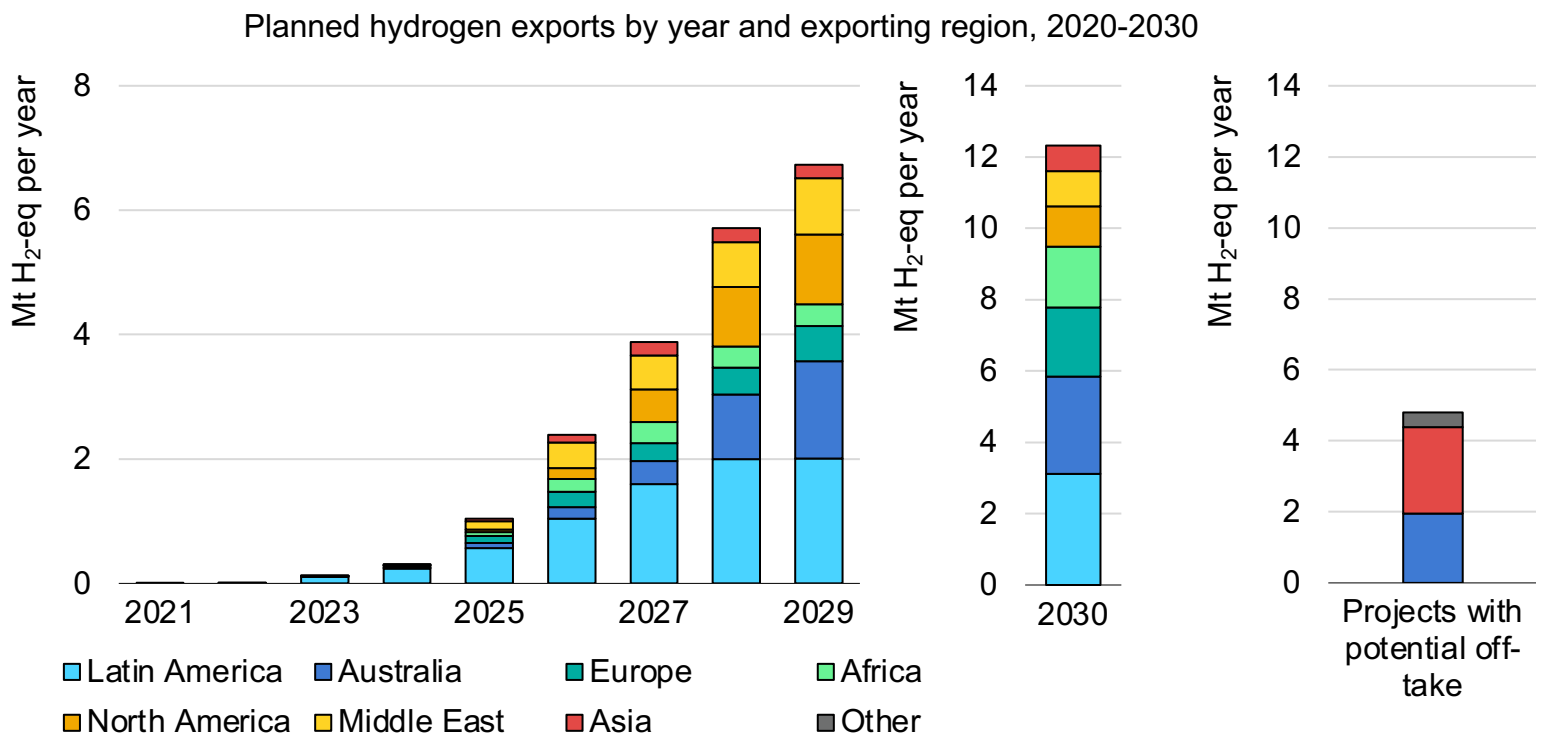
Low-emission hydrogen could reach 16-24 Mt per year by 2030. However, just a few projects are under construction or have reached FID due to uncertainties about demand, regulation and infrastructure

A new energy economy: the case of electrolyser manufacturing



Electrolyser manufacturing capacity could exceed 60 GW per year by 2030. This would be more than enough to support planned electrolyser projects and government targets.

Hydrogen trade can kick start soon, but barriers remain



Annual exports could reach 12 Mt of hydrogen by 2030, but off-take agreements are lagging behind. Key challenges remain in regulation, infrastructure, demand creation, value for exporters and trade rules

Repurposing gas infrastructure: opportunities and challenges

Selected options to repurpose natural gas infrastructure for hydrogen and ammonia

Infrastructure	Option	Advantages	Disadvantages
Gas pipelines	**Full repurposing to hydrogen**	Lower costs than new pipelines	Technical feasibility depends on pipeline material
	Build new hydrogen pipeline	Optimal material choice and design for hydrogen	Higher costs than repurposing
LNG import terminals	**Repurpose for LH_2**	Use of existing site and civil works	Complete replacement or significant modification of key equipment, e.g. storage tank, pipes
	Design new LH_2 terminal for initial LNG use	Key equipment (storage tank, pipes) can be used for LNG	No experience with LH_2 storage tanks at the size of LNG ones
	Repurpose for ammonia	Storage tank and piping can be used	Heavier weight of ammonia limits maximum capacity of storage tank
	Design new LNG terminal to be ammonia-ready	Lower repurposing costs compared to standard LNG terminal design	Heavier weight of ammonia requires stronger foundation for tank and pipe support

IEA policy recommendations

1. Move from announcements to policy implementation

2. Raise ambitions for demand creation in key applications

3. Identify opportunities for hydrogen infrastructure & ensure that short-term actions align with long-term plans

4. Intensify international cooperation for hydrogen trade

5. Remove regulatory barriers